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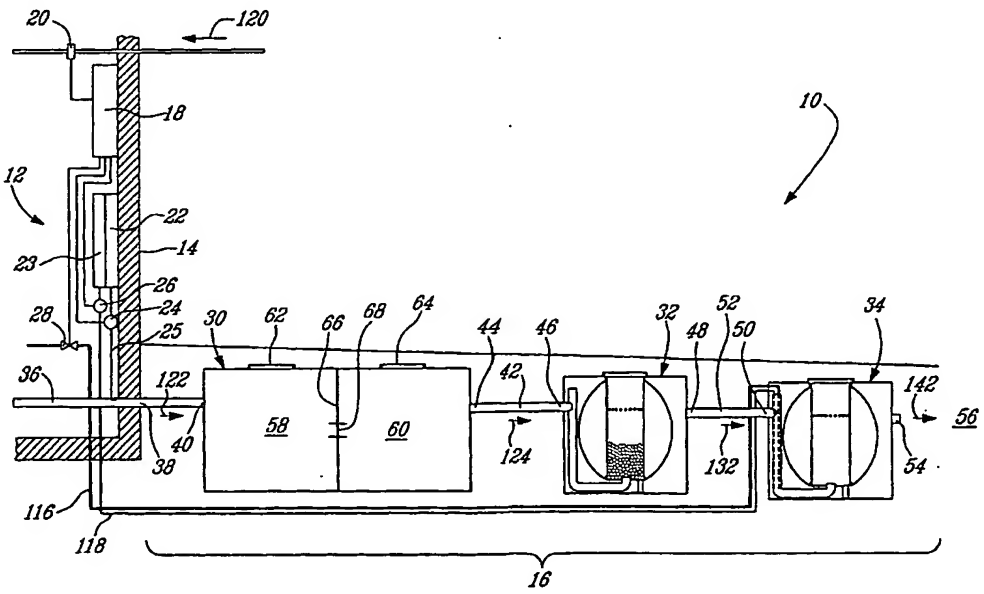
(54) Title: METHOD AND SYSTEM FOR THE TREATMENT OF WASTEWATER



(57) Abstract: A method and system for the treatment of wastewater coming out of buildings where the wastewater is treated in free flow, i.e., not requiring pumps is described herein. The system determines the quantity of fresh water entering the building and supplies a quantity of wastewater treatment solution that is a function of the quantity of entering fresh water. The system includes a conventional septic tank and two sanitization modules connected in series and automatically controlled by a controller. Compressed air and aseptic solution may also be supplied

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TITLE OF THE INVENTION

METHOD AND SYSTEM FOR THE TREATMENT OF WASTEWATER

FIELD OF THE INVENTION

The present invention relates to a system and a method for the treatment of wastewater. More specifically, the present invention is concerned with such a method and apparatus where the wastewater is supplied in free flow.

BACKGROUND OF THE INVENTION

The basic technique involved in the treatment of wastewater of any kind of aqueduct network, generally consists in carrying the wastewater coming out of buildings to a wastewater treatment plant that will treat and reduce the level of contamination therein.

As for the organized sewerage systems, even though they have been effective enough to reduce as high as 90% of the contamination level of the treated water rejected into the streams, their level of stability is rather low. Indeed, the conventional systems are vulnerable to external forces or even subject to their own deficiencies such as, for example

- unequal supply of the wastewater, mainly due to steep or abrupt soil;
- complex mechanics which will in time result in the breakage of components of the treatment system; and
- unstable effluent which stems from similar reason as the unequal supplying problem.

For treating wastewater, several known techniques, particularly those used for the residential network, are faced with the previously discussed drawbacks.

An example of such technology is a "rotational BIO-DISK", as referred to in the art, which constitutes a rotating biologic contactor. This apparatus generates reactions of natural biodegradation and BOD (Biochemical Oxygen Demand) to realize nitrification and denitrification treatments of wastewater.

Unfortunately, one drawback of using this technology is the presence of underground electrical units which makes maintenance difficult. Furthermore, the useful life of these underground elements is relatively short. In addition, the expensive maintenance and unstable waste complicate the operating process.

The wastewater technology known as disposal is faced with similar problems. As his name implies, it is used for disposing or storing wastewater (or any type of polluted liquid).

Notwithstanding the two preceding conventional wastewater treatment technologies, the most conventional and frequently employed wastewater treatment system for remote dwelling units is the combination septic tank / purification plant. As well known to those skilled in the art, a septic tank is a waterproof reservoir that receives wastewater for its subsequent purification in the soil. As for the purification plant, also known as a drainfield, it is a sub-system that receives the effluent of the septic tank and executes the bioremediation action. i.e., a biological cleanup operation which generate a reduction of the concentration of bacterial in a selected contaminated area.

Nevertheless, the above-mentioned techniques are subject to a common problem: the noticeable presence of pollution in the area in which the wastewater is discharged.

In addition, even if the foregoing conventional method, i.e. the septic tank / purification plant combination, has been a common use for quite some time now, its use comes with several drawbacks such as:

- the decreased watertightness of the septic tank
- the reduced permeability capacities of the soil just off the groundwater sheet which lowers the efficiency of the drainfield; and
- contamination of the clean water well.

Consequently, it can be understood that there is an obvious need for an improved wastewater treatment technique.

OBJECTS OF THE INVENTION

An object of the present invention is therefore to provide an improved wastewater treatment system and method.

SUMMARY OF THE INVENTION

More specifically, according to an aspect of the present invention, there is provided a system for treating wastewater from a building including a fresh water inlet and a wastewater outlet; said system comprising:

a controller;

a fresh water sensor associated with the fresh water inlet and connected to said controller to supply fresh water entry data to said controller;

a reservoir to contain a wastewater treatment solution;

a valve controlled by said controller and provided between said reservoir and the wastewater outlet;

wherein said controller controls said valve so that a quantity of wastewater treatment solution supplied to said wastewater outlet is a function of the sensed freshwater entering said building.

According to a second aspect of the present invention, there is provided a system for treating wastewater from a building including a fresh water inlet and a wastewater outlet connected to a septic tank; said system comprising:

a wastewater sanitization assembly including:

- a first sanitization module provided downstream from the septic tank;

- a second sanitization module provided downstream from said first sanitization module;

a control assembly including:

- a controller;

- a fresh water sensor associated with the fresh water inlet and connected to said controller to supply fresh water entry data to said controller;

- a first reservoir to contain a first wastewater treatment solution;

- a first pump controlled by said controller and provided between said first reservoir and the wastewater outlet;

- a second reservoir to contain a second wastewater treatment solution;

- a second pump controlled by said controller and provided between said second reservoir and said second sanitization module;

wherein said controller controls said valve so that a) a quantity of the first wastewater treatment solution supplied to said wastewater outlet is a function of the sensed freshwater entering said building; and b) a quantity of the second wastewater treatment solution supplied to said second sanitization module is a function of the sensed freshwater entering said building.

According to a third aspect of the present invention, there is provided a method for treating wastewater from a building including a fresh water inlet and a wastewater outlet, said method comprising the acts of :

measuring a quantity of fresh water entering the building;

dispensing a quantity of a wastewater treatment solution to the wastewater outlet; wherein the quantity of wastewater treatment solution is a function of the measured quantity of fresh water entering the building.

According to a fourth aspect of the present invention, there is provided a method for treating wastewater from a building including a fresh water inlet and a wastewater outlet connected to a septic tank, said method comprising the acts of :

measuring a quantity of fresh water entering the building;

providing a first sanitization module downstream from the wastewater outlet;

providing a second sanitization module downstream from the first sanitization module;

dispensing a quantity of a first wastewater treatment solution to the wastewater outlet; the quantity of the first wastewater treatment solution dispensed being a function of the measured quantity of fresh water entering the building; and

dispensing a quantity of a second wastewater treatment solution to the second sanitization module; the quantity of the second wastewater treatment solution dispensed being a function of the measured quantity of fresh water entering the building.

BRIEF DESCRIPTION OF THE DRAWINGS

In the appended drawings:

Figure 1 is a schematic sectional side elevational view of a wastewater treatment system according to a first embodiment of the present invention;

Figure 2 is a schematic sectional side elevational view of the second sanitization module of the wastewater treatment system of Figure 1;

Figure 3 is a schematic sectional side elevational view of the third sanitization module of the wastewater treatment system of Figure 1;

Figure 4 is a schematic sectional side elevational view of a wastewater treatment system according to a second embodiment of the present invention;

Figure 5 is a schematic sectional side elevational view of the second sanitization module of the wastewater treatment system of Figure 4;

Figure 6 is a schematic sectional side elevational view of the third sanitization module of the wastewater treatment system of Figure 4;

DESCRIPTION OF PREFERRED EMBODIMENTS

In a nutshell, the present invention involves a method and an apparatus for treating wastewater. The system conveys and controls the wastewater from a dwelling unit to a conventional septic tank connected to two sanitization modules which will degenerate, by means of an injecting device, the biodegradable compounds present therein. Subsequently, the treated wastewater is discharged in the environment.

A first embodiment of the present invention will now be described with reference to the appended Figures 1 to 3.

A wastewater treatment system 10 is illustrated in Figure 1 of the appended drawings. It can be seen from this figure that the system is constituted of a control assembly 12, which is located inside a building 14 and a wastewater sanitization assembly 16 located outside the building 14.

As seen in this figure, the control assembly 12 includes a controller 18 comprising an integrated electronic circuit (not shown), a flow sensor 20, connected to the controller 18, which detects the amount of

freshwater entering in the building 14 and two reservoirs 22, 23 which contain wastewater treatment solutions. More specifically, the reservoirs 22 and 23 respectively contain a solution containing enzymes and bacteria, such as, for example Oxisan PA-5™ made by Constant Laboratories (Montreal, Quebec, Canada), and an aseptic solution, such as, for example, liquid certi-zyme III™ made by Certified Lab Products, a division of NCH Canada Inc, as will be described hereinbelow. Of course, other solutions could be used.

The control assembly 12 also includes a first electrically controlled pump 24 to control the quantity of enzyme and bacteria containing solution supplied to the wastewater sanitization assembly 16 via a conduit 25; a second electrically controlled pump 26 to control the quantity of aseptic solution supplied to the wastewater sanitization assembly 16 via a conduit 118 and a third electrically controlled valve 28 to control the quantity of compressed air supplied from a compressed air source (not shown) to the wastewater sanitization assembly 16 via a conduit 116. The two electrically controlled pumps 24, 26 and the electrically controlled valves 28 are controlled by the controller 18.

Of course, one skilled in the art could replaced the pumps 24 and 26 by valves, should the reservoirs 22 and 23 be pressurized, for example.

As will be apparent to one skilled in the art the valve 28 could be replaced by a compressor (not shown) controlled by the controller 18 to supply compressed air as will be described hereinbelow.

As stated hereinabove, the wastewater sanitization assembly 16 illustrated in Figure 1 is the outdoor and treating portion of the system 10. Indeed, it includes a septic tank 30 and a series of a two

sanitization modules 32 and 34, all serially connected by conduits which carry the wastewater from one element to another as will be described hereinbelow.

A first conduit 36, defining the wastewater outlet 38 of the building 14 carries out the free flowing wastewater from the building 14 to the inlet 40 of the wastewater sanitization assembly 16 defined by the inlet of the conventional septic tank 30.

A second conduit 42 transfers the wastewater from the outlet 44 of the conventional septic tank 30 to the inlet 46 of the first sanitization module 32. The water exiting the first sanitization module 32 via its outlet 48 is transferred to the inlet 50 of the second module 34 by a third conduit 52. Finally, a fourth conduit 54 transfers the treated water from the second sanitization module 34 to the external environment 56.

The septic tank 30 is conventional. It therefore includes two compartment 58 and 60, provided with respective covers 62, 64. The compartments are divided by a wall 66 provided with an aperture 68.

As will easily be understood by one skilled in the art, the septic tank 30 will conventionally collect the major portion of the solid matter contained in the wastewater transferred thereto via the conduit 36.

As illustrated in Figure 1, the injection of the enzyme and bacteria containing solution from the reservoir 22 via the valve 24 is done prior to the entry of the wastewater in the septic tank 30. Therefore, the wastewater entering the septic tank 30 contains a predetermined amount of the enzyme and bacteria containing solution.

The first sanitization module 32 will now be described with respect to Figure 2.

The sanitization module 32 includes a body 70 provided with a top aperture 72 closed by a removable cover 74. The module 32 also includes a vertical and cylindrical container 76 inserted in the body 70 via the aperture 72, and a filtering pouch 78 provided with first and second mounting rings 80 and 82 configured and sized to be snugly mounted to container 76 so as to enclose the container 76. The filtering pouch 78 is made of geo-textile material, a durable material that is adequate to filter a portion of the suspended matter in the wastewater as will be described hereinbelow. Of course, other adequate filtering materials could be used.

The inlet 46 of the first sanitization module 32 is connected to a bottom inlet 84 of the vertical container 76 via a J-shaped conduit 86. Therefore, the container 76 will be filled from underneath as will be described in the foregoing disclosure. The conduit 86 is provided with a vent 88 to prevent backflow.

The vertical and cylindrical container 76 is provided with peripheral outlet apertures 90 allowing the wastewater to flow from the container 76 to the filtering pouch 78.

It is to be noted that since the system 10 operates in free flow, the apertures 90 are slightly lower than the inlet 46 and the outlet 48 is slightly lower than the apertures 90.

Small polymer "balls" 92, which will be referred herein as "bio-media elements", fill the vertical container 76. These bio-media elements 92, which operate as a non-clogging media, attract the bacteria injected in the

wastewater to improve the reduction of the molecular organic load present in the wastewater by increasing the contact surface between the bacteria and the wastewater.

The bio-media elements 92 are generally spherical and provided with channels in their external surface to increase the area of contact between the bacteria and the wastewater. It has been found that bio-media elements having an area ranging from about 20 to about 500 square feet by cubic feet are adequate for the use in the present application. It has been found that the product Fabco/Jaeger Tri-Packs® made by Fabco Plastiques Inc. is adequate for this application.

It should be mentioned that while the bio-media elements 92 illustrated in Figure 2 are spherical, other shapes can be used, for example, serrated cylindrical shaped elements (not shown) could be used.

Furthermore, one skilled in the art will understand that other elements could be used in place of the bio-media elements 92. For example, bio-media elements made of pieces of geo-textile material could be used to increase the surface of contact between the bacterial injected and the wastewater.

As will easily be understood by one skilled in the art, the wastewater entering the vertical container 76 via the bottom inlet 84 upwardly percolates through the bio-media elements 92 before reaching the apertures 90 and are therefore submitted to the bacterial action of the bacteria present on the surface of the bio-media elements 92.

Therefore, one skilled in the art will understand that to go from the inlet 46 to the outlet 48, the wastewater must go through the bio-media elements 92 and through the filtering pouch 78.

As mentioned hereinabove with reference to Figure 1, the wastewater is transferred from the outlet 48 of the first module 32 to the inlet 50 of the second module 34 via a conduit 52.

The second module 34, illustrated in Figure 3, is very similar to the second module described hereinabove with respect to Figure 2.

More specifically, the second module 34 includes a body 94 provided with an aperture 96 closed by a cover 98, a vertical and cylindrical container 100 provided with apertures 102, a filtering pouch 104 provided with top and bottom mounting rings 106 and 108, respectively, a J-shaped conduit 110 connecting the inlet 50 to a bottom aperture 112 of the container 100 and provided with a vent 114.

The second module 34 also includes two additional conduits 116 and 118. The conduit 116 is connected to the electrically controlled valve 28, thereby allowing compressed air to be injected in the J-shaped conduit 110 and into the vertical container 100. Similarly, the conduit 118 is connected to the electrically controlled pump 26, thereby allowing the aseptic solution contained in the reservoir 23 to be injected in the J-shaped conduit 110, as will be described hereinbelow.

It is to be noted that the filtering pouches 78 and 104 of the modules 32 and 34, respectively, may be removed through the apertures 72 and 96 for cleaning purposes.

It is also to be noted that the bodies 70 and 94 are made of a material that is suitable to be buried, such as, for example, plastic or composite material.

Returning to Figure 1 of the appended drawings, the operation of the wastewater treatment system 10 will be described. The quantity of fresh water entering the building 14 (see arrow 120) is detected by the sensor 20 and this information is supplied to the controller 18. The controller 18 may then dynamically determine the amount of enzyme and bacteria containing solution to transfer from the reservoir 22 to the septic tank 30 via the conduit 36 and the amount of aseptic solution to transfer from the reservoirs 23 to the second module 34 via the conduit 36. Similarly, the injection of compressed air via the valve 28 is also controlled according to the amount of fresh water entering the building 14. Indeed, the system 10 operates on the assumption that a major portion of the fresh water entering a building becomes wastewater in a relatively short time. It is therefore possible to forego the more complicated detection of exiting wastewater from the building 14.

The wastewater, represented by arrow 122, coming out of the building 14, is transferred to the septic tank 30 via the conduit 36. In the conventional septic tank 30, the wastewater undergoes a decanting process and is naturally mixed with the enzyme and bacteria containing solution. This constitutes a first phase of the treatment process of the wastewater where a portion of the suspended solid matter is conventionally removed from the wastewater.

The decanted wastewater then flows from the septic tank 30 to the first sanitization module 32 via the conduit 42 (see arrow 124). In the first module 32, a second phase of the wastewater treatment takes over. In

this second phase, the solid matter still in suspension in the decanted wastewater is treated in the bio-media elements 92. Indeed, to go to the outlet 48 from the inlet 46, the decanted wastewater has to pass upwardly through the bio-media elements 92 (see arrows 126). Since microorganisms are attached to the bio-media elements to reduce the molecular organic load present in the wastewater, a "digestion" of the organic matter takes place in the container 76.

After being submitted to this digestion process, the wastewater exits from the container 76 via the apertures 90 (see arrows 128 in Figure 2) and thereby enters the filtering pouch 78. By going through the filtering pouch 78 (see arrows 130 in Figure 2), smaller suspended digested solid particles are filtered from the wastewater.

The wastewater is then transferred to the second sanitization module 34 via the conduit 52 (see arrow 132).

As mentioned hereinabove, the aseptic solution delivery tube 118 and the compressed air supply tube 116 are inserted in the J-shaped tube 110 via its vent 114.

As may be better seen in Figure 3, due to the simultaneous action of the injected pressurized air (see arrow 136) through tube 116 and of the aseptic solution (see arrow 134) through tube 118, a better diffusion of the aseptic solution in the container 100 may take place.

Again, once the wastewater exits from the apertures 102 (see arrow 138), it still has to go through the pouch 104 (see arrow 140) to be filtered thereby.

As will be easily understood by one skilled in the art, the purpose of the injection of the aseptic solution in the module 34 is to kill the bacteria present in the treated wastewater. Even though Oxisan PA-5 is a possible aseptic solution, one skilled in the art that other substances such as, chlorine or hydrogen peroxide, for example, could be used.

It is to be noted that should chlorine be used, it would be advantageous to provide a chlorine filter in which the treated wastewater could go through before being released in the external environment 56. Such a filter could be provided after the sanitization module 34 and could take the form of a third module (not shown) similar to the module 34 but where the cylindrical container would be filled with activated carbon.

Finally, the now purified wastewater (see arrow 142) is carried out of the system 10, throughout the outlet 54 into the external environment 56.

Turning Now to Figure 4-6 of the appended drawings, a wastewater treatment system 200 according to a second embodiment of the present invention will be described.

It is to be noted that since the system 200 is very similar to the system 10 described hereinabove with reference to Figures 1-3, and for concision purposes, only the differences between these two systems will be described in details hereinbelow.

The system 200 includes a control assembly 202 and a wastewater sanitization assembly 204.

The control assembly 202 includes:

- a controller 18 comprising an integrated electronic circuit (not shown);
- a flow sensor 20; connected to the controller 18, which detects the amount of freshwater entering in the building 14;
- two reservoirs 22, 23 which respectively contain a solution containing enzymes and bacteria and an aseptic solution, such as for example, hydrogen peroxide, as will be described hereinbelow;
- an electronically controlled valve 24 interconnecting the reservoirs 22 to the conduit 26 and controlled by the controller 18;
- an intermediate mixing reservoir 206 connected to the reservoir 23 via the valve 26 and receiving treated wastewater from the sanitization module 34 via a conduit 208 and a pump 210 controlled by the controller 18;
- a pump 212 returning a controlled mix of the aseptic solution and of treated wastewater to the sanitization module 34; the pump 212 also optionally assisting the mixing of the wastewater contained in the sanitization module 34;
- optionally, a water quality testing apparatus (not shown) mounted to or near the mixing reservoir 206 to test the incoming wastewater from the module 34 and to supply this information to the controller 18 (see dashed line 214); and

- an electronically controlled valve 28 supplying compressed air to the sanitization modules 32 and 34.

As will be understood by one skilled in the art, the function of the intermediate mixing reservoir 206 is to provide a larger quantity of liquid to pump to the second sanitization module 34. Indeed, it has been found that it may be interesting to use a concentrated aseptic solution and to dilute it with water coming from the second sanitization module 34. This way it is possible to install a water testing apparatus (not shown) to ensure that the treated wastewater released in the external environment 56 meets the appropriate standards.

Of course, it would be possible to mix the concentrated aseptic solution with fresh water.

Alternatively, the mixing reservoir 206 could be replaced by an internal mixer, for example a tube provided with two inlets; an outlet and internal blades forcing the mixing of the liquids entering the inlets. The expression "mixing reservoir" is therefore to be construed as including internal mixers.

Another potential advantage of having a pump 210 it to mix the wastewater contained in the module 34 by constantly pumping wastewater and returning it without necessarily adding aseptic solution thereto. It is to be noted that this is not a required feature of the present invention.

The wastewater sanitization assembly 204 is very similar to the wastewater sanitization assembly 16.

A first difference between these systems is the fact that compressed air is supplied to both sanitization modules 32 and 34 (see conduits 116 and 216.

Furthermore, turning to Figure 5 of the appended drawings, the tube 216 bringing compressed air to the module 32 is divided in 2 via a "T" junction. A first tube 218 goes down to an air diffuser 220. The air diffuser 220 creates small air bubbles (see arrows 222) that oxygenate the wastewater that has filtered through the filter 78.

A second tube 224 enters the cylindrical container 76 and leads to an air diffuser 226 that creates small air bubbles (see arrows 228) that oxygenate the wastewater that is present in the container 76. It is to be noted that a manually adjustable restriction valve 225 is provided to allow the initial adjustment of the quantity of air supplied to both diffusers 220 and 232. Indeed, since the diffusers are not the same dimensions and are provided at different height such a valve is appropriate for initial adjustments of the system.

Similarly, the sanitization module 34 includes the split air tube 230, 234, the two air diffusers 232 and 236 and the valve 235 (see Figure 6).

The diffusers 220 and 232 may be, for example, 60 inches (about 1.5 m) Oxy-Pro™ diffusers sold by Aquipro (St-Appolinaire, Quebec, Canada) and the diffusers 226 and 236 may be, for example, 12 inches (about 0,3 m) Oxy-Pro™ diffusers sold by Aquipro (St-Appolinaire, Quebec, Canada).

Returning to Figure 5, another difference is the outlet of the sanitization module 32. Indeed, this outlet is formed of a T-junction 238 to allow the water to flow from a lower portion of the module 32 (see arrow 242). Similarly, the module 34 includes a T-junction 240 as an outlet.

Another difference concerns the aforementioned conduit 208 used to pump a small quantity of treated wastewater from the second sanitization module 34 into the mixing reservoir 206 (see arrow 244).

As will be understood by one skilled in the art, the operation of the wastewater treatment system 200 is very similar to the operation of the wastewater treatment system 10 and will therefore not be discussed further herein.

One advantage of using the wastewater treatment system of the present invention is that the electrical components are mounted inside the building 14 and not in the ground 56. Indeed, this is an advantage since it allows to externally control the treatment operations and to facilitate the maintenance of the equipment. Similarly, it increases the useful life of the electronic circuitry since it is kept in a controlled environment.

Another advantage of the wastewater treatment system is that new bacteria and enzyme containing solution is constantly added to the wastewater exiting the building 14, thereby ensuring that there is constantly an adequate quantity of enzymes and bacteria in the septic tank and sanitization module 32.

One skilled in the art will also understand that the maintenance of the sanitization modules 32 and 34 may easily be done via

the covers 74 and 98 which may be lightly recovered with ground (as shown in the appended figures) or could be level with the ground for easier reach.

Depending on the degree of treatment of the wastewater, it would be possible to omit the filtering pouches 78 and 104.

It is to be noted that the expression "free flow" as used in the present description and in the appended claims relates to water flowing without any externals forces such as pumps, i.e., which follows his natural "downward" course.

Of course, it will easily be understood by one skilled in the art that the dimensions of the elements of the system described hereinabove could be adapted to suit different ranges of water treatment.

Although the present invention has been described hereinabove by way of preferred embodiments thereof, it can be modified, without departing from the spirit and nature of the subject invention as defined in the appended claims.

WHAT IS CLAIMED IS:

1. A system for treating wastewater from a building including a fresh water inlet and a wastewater outlet; said system comprising:

a controller;

a fresh water sensor associated with the fresh water inlet and connected to said controller to supply fresh water entry data to said controller;

a reservoir to contain a wastewater treatment solution;

a valve controlled by said controller and provided between said reservoir and the wastewater outlet;

wherein said controller controls said valve so that a quantity of wastewater treatment solution supplied to said wastewater outlet is a function of the sensed freshwater entering said building.

2. The wastewater treatment system of claim 1, wherein said wastewater treatment solution contains enzymes.

3. The wastewater treatment system of claim 1, wherein said wastewater treatment solution contains bacteria.

4. A system for treating wastewater from a building including a fresh water inlet and a wastewater outlet connected to a septic tank; said system comprising:

a wastewater sanitization assembly including:

- a first sanitization module provided downstream from the septic tank;

- a second sanitization module provided downstream from said first sanitization module;

a control assembly including:

- a controller;

- a fresh water sensor associated with the fresh water inlet and connected to said controller to supply fresh water entry data to said controller;

- a first reservoir to contain a first wastewater treatment solution;

- a first pump controlled by said controller and provided between said first reservoir and the wastewater outlet;

- a second reservoir to contain a second wastewater treatment solution;

- a second pump controlled by said controller and provided between said second reservoir and said second sanitization module;

wherein said controller controls said valve so that a) a quantity of the first wastewater treatment solution supplied to said wastewater outlet is a function of the sensed freshwater entering said building; and b) a quantity of the second wastewater treatment solution supplied to said second sanitization module is a function of the sensed freshwater entering said building.

5. The wastewater treatment system of claim 4, wherein said first wastewater treatment solution contains enzymes.

6. The wastewater treatment system of claim 4, wherein said first wastewater treatment solution contains bacteria.

7. The wastewater treatment system of claim 4, wherein said second wastewater treatment solution contains an aseptic solution.

8. The wastewater treatment system of claim 7, wherein said aseptic solution contains hydrogen peroxide.

9. The wastewater treatment system of claim 4, wherein said control assembly also includes a valve controlled by the controller and provided between a compressed air source and said second sanitization module.

10. The wastewater treatment system of claim 9, wherein said second sanitization module includes at least one air diffuser connected to said valve.

11. The wastewater treatment system of claim 4, wherein said control assembly also includes a valve controlled the controller and provided between a compressed air source and said first sanitization module.

12. The wastewater treatment system of claim 11, wherein said second sanitization module includes at least one air diffuser connected to said valve.

13. The wastewater treatment system of claim 4, wherein said first sanitization module includes:

a body;

a generally vertical container provided with a bottom inlet and at least on peripheral outlet aperture; said container being mounted in said body

a plurality of bio-media elements provided in said container;

whereby a) wastewater entering said bottom inlet of said first sanitization module percolates through the bio-media elements before exiting the container via said at least one peripheral outlet aperture ; and b) wastewater exiting said container via said at least one peripheral aperture is filtered through said filtering pouch.

14. The wastewater treatment system of claim 13 further comprising a filtering pouch enclosing said vertical container.

15. The wastewater treatment system of claim 13, wherein said body of said first sanitization module includes:

an inlet aperture connected to said bottom inlet aperture of said container;

an outlet aperture provided slightly lower than said inlet aperture;

and wherein said peripheral outlet apertures of said container are provided slight lower than said body inlet aperture and slightly higher than said body outlet aperture.

16. The wastewater treatment system of claim 4, wherein said second sanitization module includes:

a body;

a generally vertical container provided with a bottom inlet and at least on peripheral outlet aperture; said container being mounted in said body

a plurality of bio-media elements provided in said container;

whereby a) wastewater entering said bottom inlet of said first sanitization module percolates through the bio-media elements before exiting the container via said at least one peripheral outlet aperture ; and b) wastewater exiting said container via said at least one peripheral aperture is filtered through said filtering pouch.

17. The wastewater treatment system of claim 16 further comprising a filtering pouch enclosing said vertical container.

18. The wastewater treatment system of claim 16, wherein said body of said second sanitization module includes:

an inlet aperture connected to said bottom inlet aperture of said container;

an outlet aperture provided slightly lower than said inlet aperture;

and wherein said peripheral outlet apertures of said container are provided slight lower than said body inlet aperture and slightly higher than said body outlet aperture.

19. The wastewater treatment system of claim 4, wherein said control assembly also includes:

an intermediate mixing reservoir provided between said second pump and said second sanitization module;

a third pump provided between said intermediate mixing reservoir and said second sanitization module; said third pump being controlled by said controller;

a fourth pump provided between said second sanitization module and said intermediate mixing reservoir; said fourth pump being controlled by said controller;

wherein said fourth pump transfers treated wastewater from said second sanitization module to said intermediate mixing reservoir to dilute said second treatment solution pumped in said intermediate mixing reservoir by said second pump; said third pump returning the diluted second treatment solution to said second sanitization module.

20. The wastewater treatment system of claim 19, wherein said control assembly also includes a water quality testing apparatus associated with said intermediate mixing reservoir to test the quality of the treated wastewater pumped from the second sanitization module by said fourth pump.

21. A method for treating wastewater from a building including a fresh water inlet and a wastewater outlet, said method comprising the acts of :

measuring a quantity of fresh water entering the building;

dispensing a quantity of a wastewater treatment solution to the wastewater outlet; wherein the quantity of wastewater treatment solution is a function of the measured quantity of fresh water entering the building.

22. The wastewater treatment method of claim 21, wherein said wastewater treatment solution dispensing act includes dispensing a bacteria containing solution.

23. The wastewater treatment method of claim 21, wherein said wastewater treatment solution dispensing act includes dispensing an enzyme containing solution.

24. A method for treating wastewater from a building including a fresh water inlet and a wastewater outlet connected to a septic tank, said method comprising the acts of :

measuring a quantity of fresh water entering the building;

providing a first sanitization module downstream from the wastewater outlet;

providing a second sanitization module downstream from the first sanitization module;

dispensing a quantity of a first wastewater treatment solution to the wastewater outlet; the quantity of the first wastewater treatment solution dispensed being a function of the measured quantity of fresh water entering the building; and

dispensing a quantity of a second wastewater treatment solution to the second sanitization module; the quantity of the second wastewater treatment solution dispensed being a function of the measured quantity of fresh water entering the building.

25. The wastewater treatment method of claim 24, wherein said first wastewater treatment solution dispensing act includes dispensing a bacteria containing solution.

26. The wastewater treatment method of claim 24, wherein said first wastewater treatment solution dispensing act includes dispensing an enzyme containing solution.

27. The wastewater treatment method of claim 24, wherein said second wastewater treatment solution dispensing act includes dispensing an aseptic solution.

28. The wastewater treatment method of claim 27, wherein said aseptic solution dispensing sub-act includes dispensing an Oxisan PA-5™ solution.

29. The wastewater treatment method of claim 24, further comprising the act of supplying compressed air to said first sanitization module.

30. The wastewater treatment method of claim 24, further comprising the act of supplying compressed air to said second sanitization module.

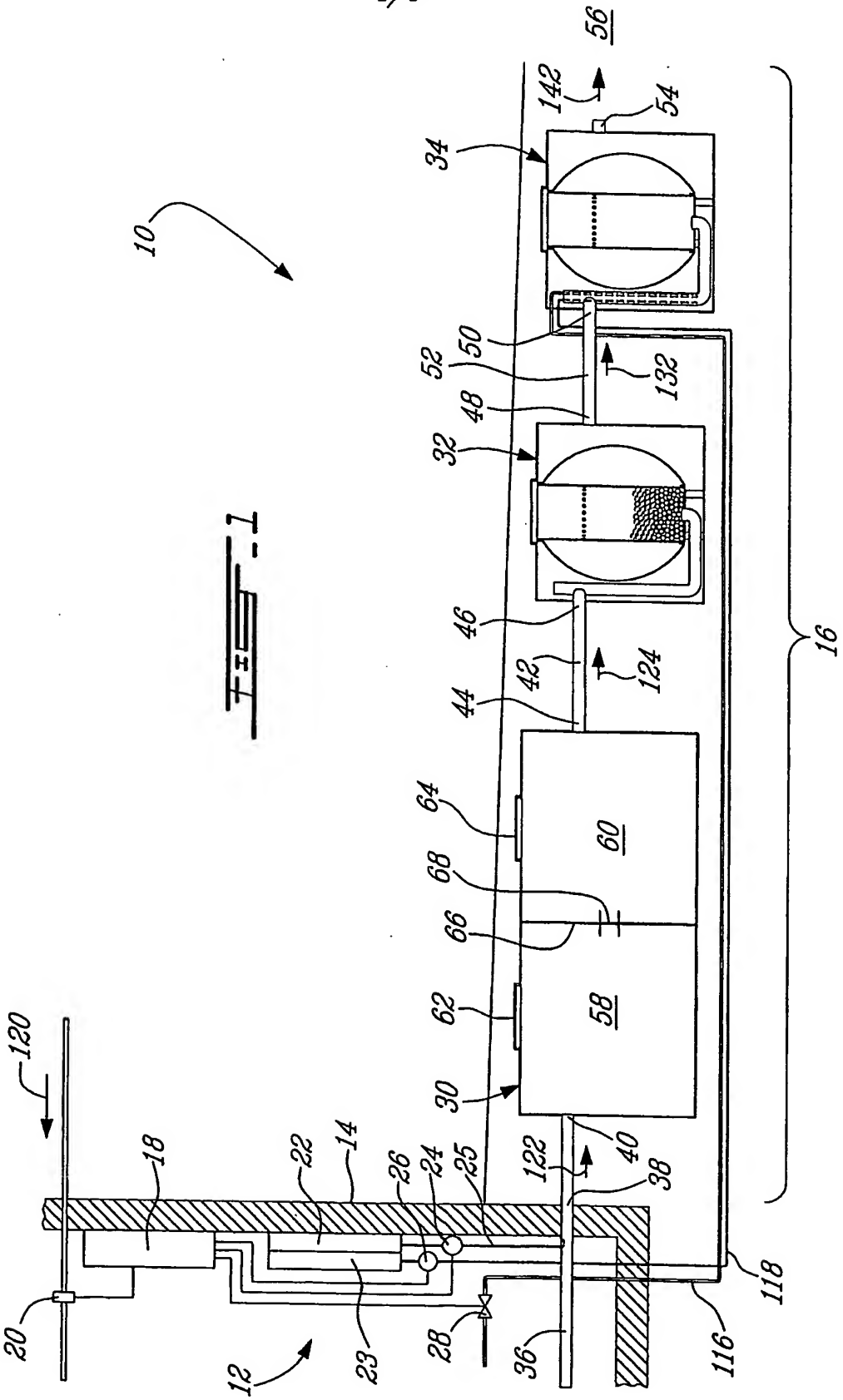
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Fig. 1

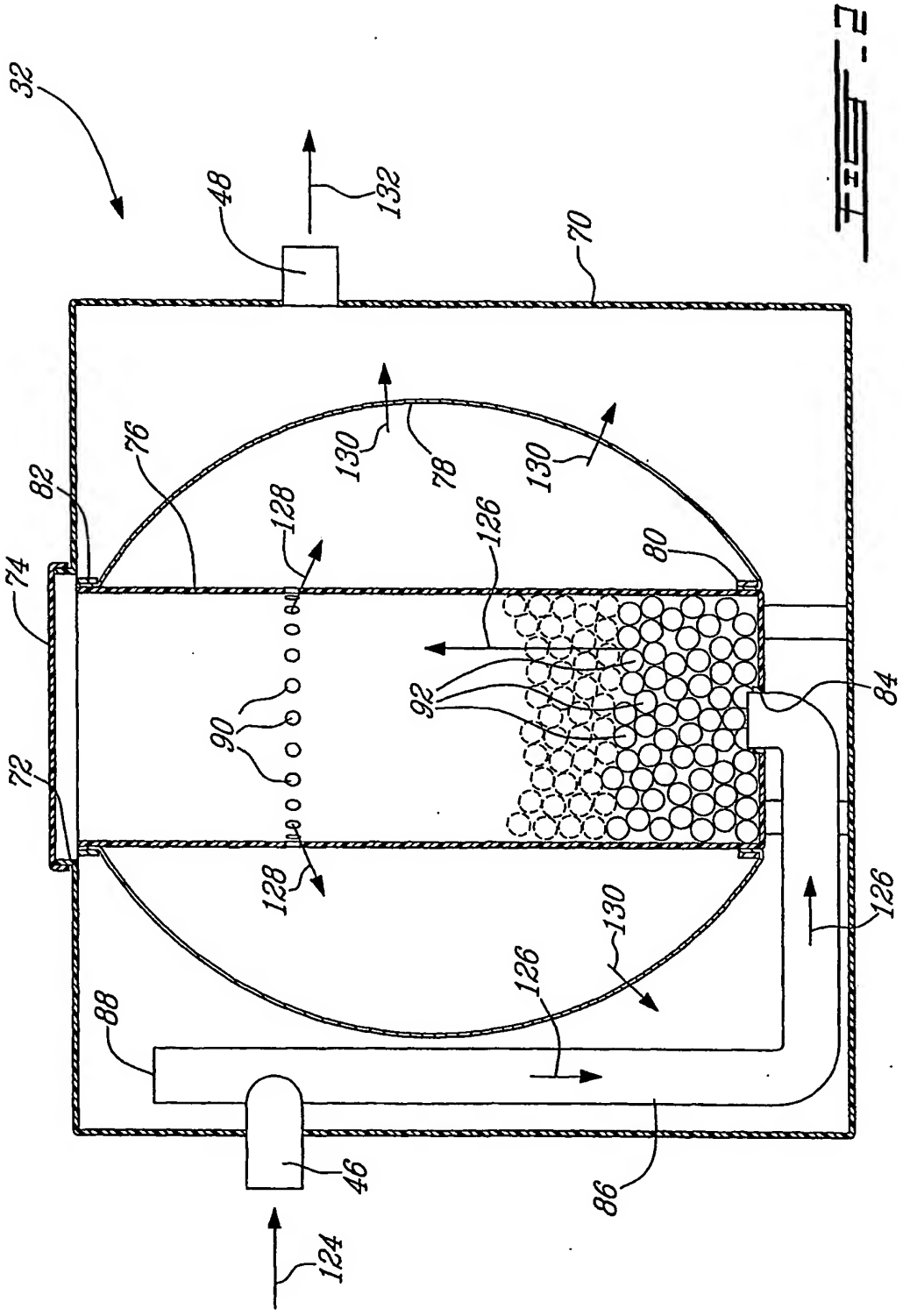
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FIG. 2

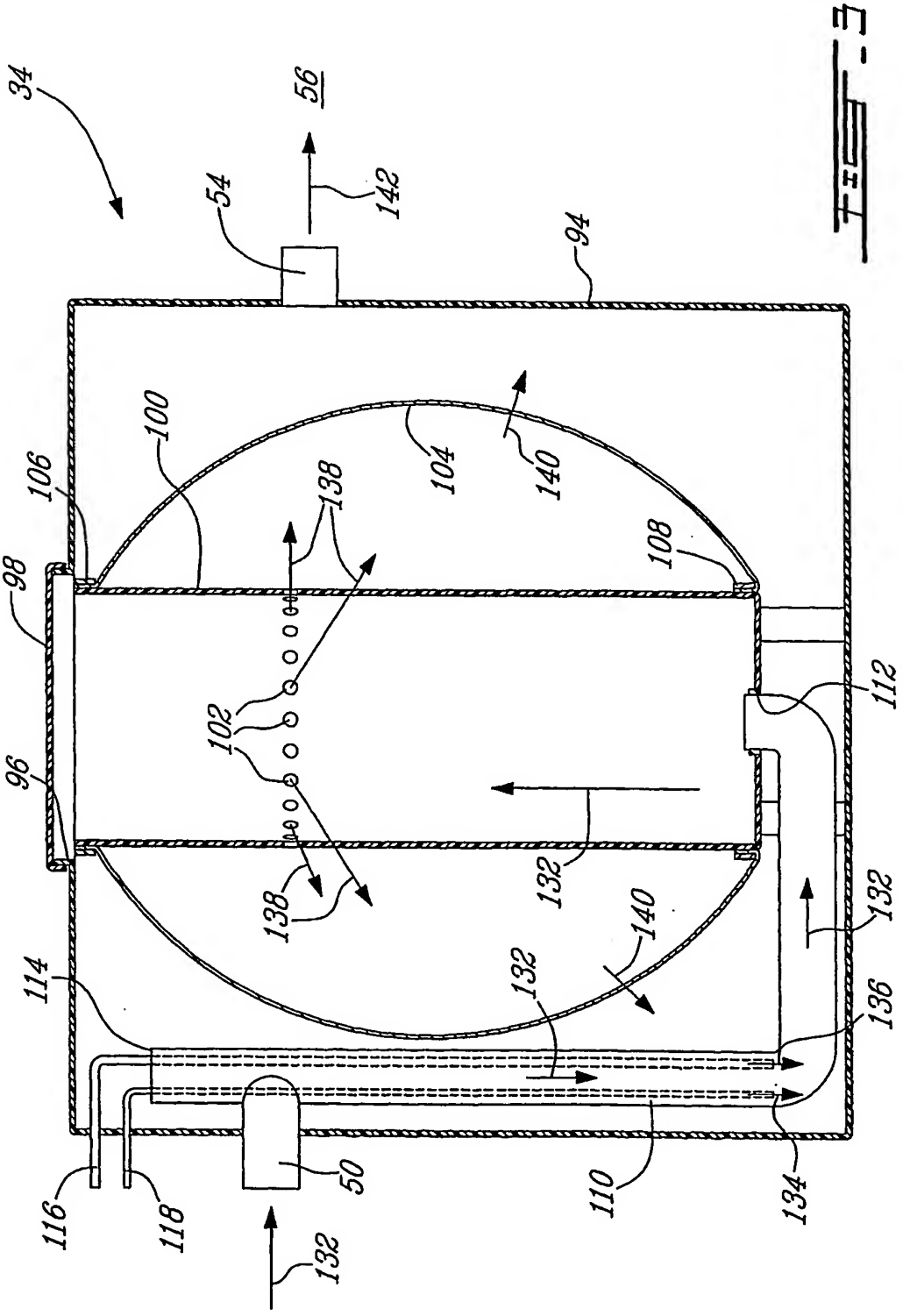
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FIG. 3

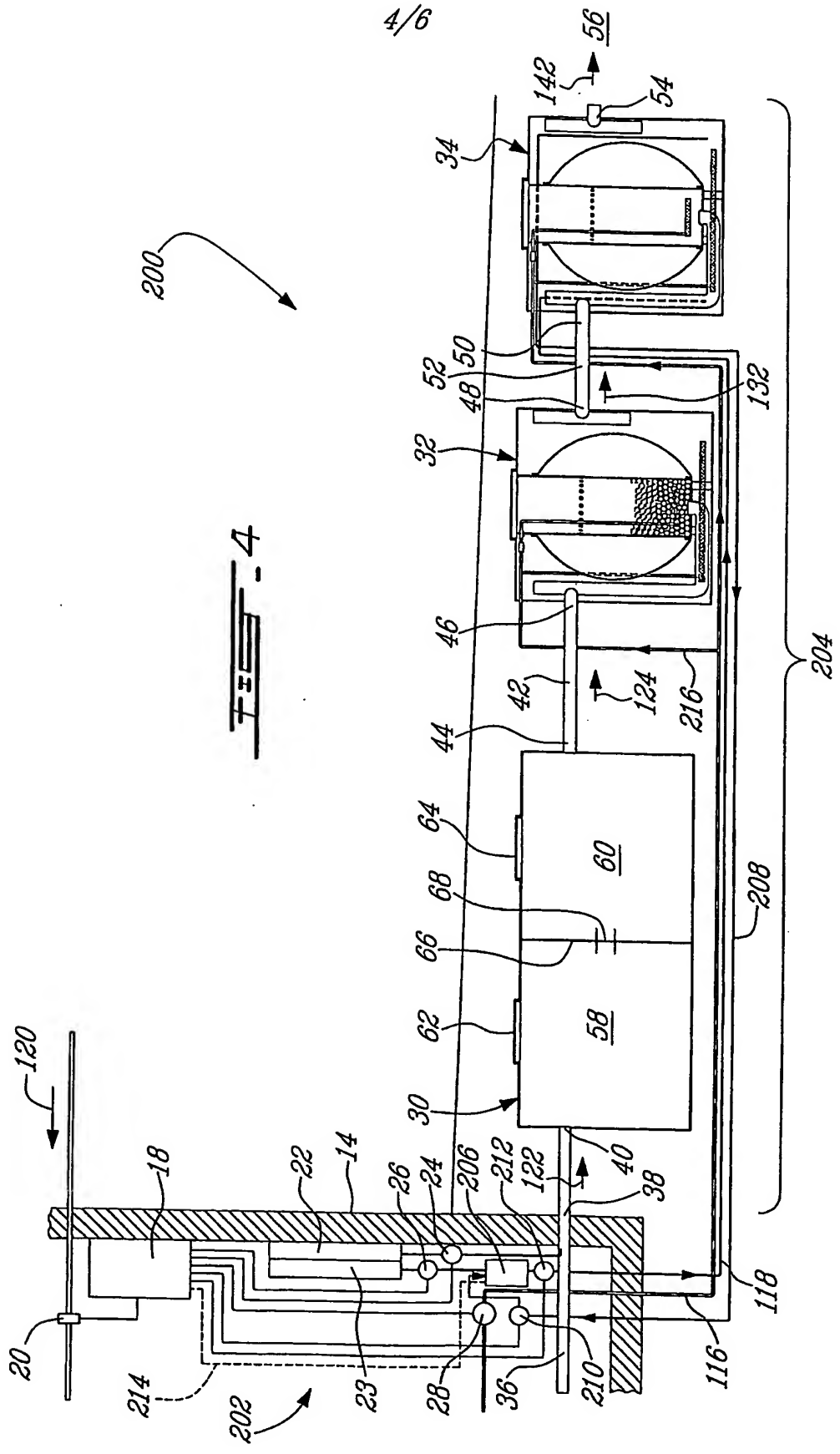
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Fig-4

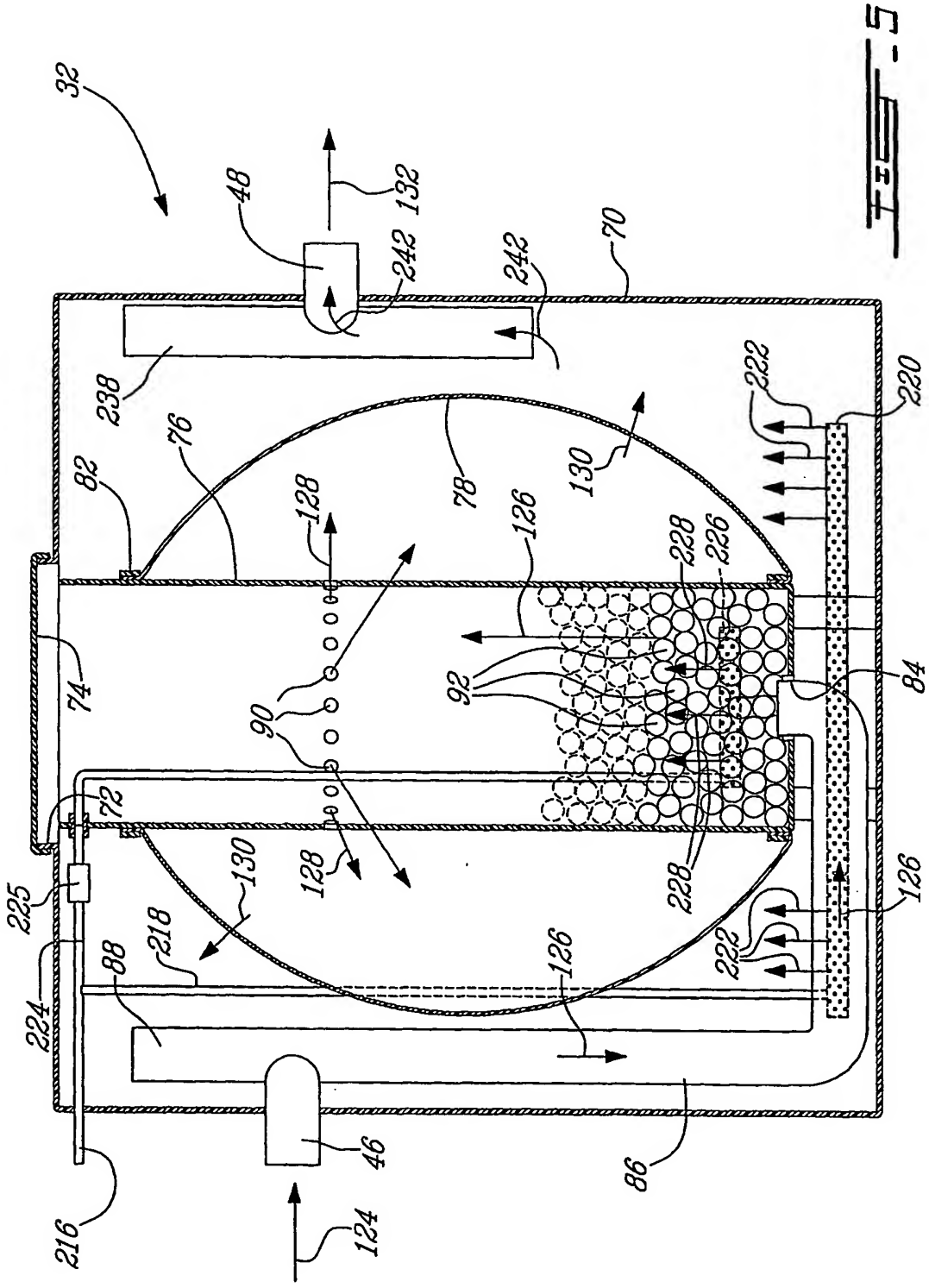
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FIG. 5

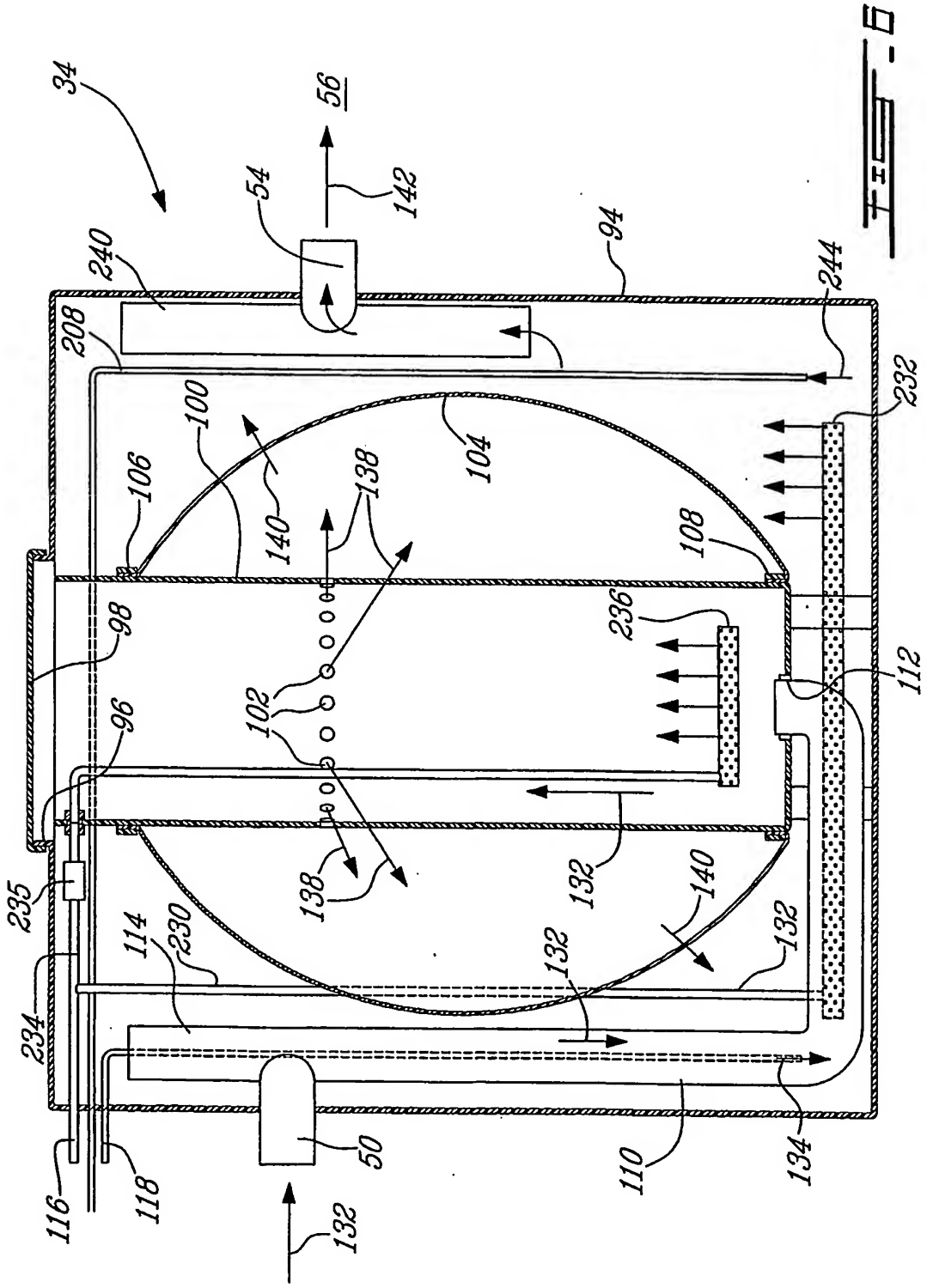
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Fig - 6

INTERNATIONAL SEARCH REPORT

International Application No
PCT/CA 02/01922

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 C02F3/00 C02F3/28 C02F3/34

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 C02F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 739 031 A (RUNYON LARRY) 14 April 1998 (1998-04-14) abstract; figure 1	1-3,21
A	FR 2 818 265 A (TOMBEUR MICHEL) 21 June 2002 (2002-06-21) the whole document	1,21
A	US 4 895 645 A (ZORICH JR NICHOLAS F) 23 January 1990 (1990-01-23) the whole document	13-19

[ ] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

* Special categories of cited documents :

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Date of the actual completion of the international search	Date of mailing of the international search report
15 August 2003	22/08/2003

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Gonzalez Arias, M

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/CA 02/01922

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5739031 A	14-04-1998	US 5447866 A	05-09-1995
		AT 202545 T	15-07-2001
		AU 710627 B2	23-09-1999
		AU 6908396 A	19-03-1997
		BR 9610266 A	21-12-1999
		CA 2228630 A1	06-03-1997
		CN 1193951 A	23-09-1998
		DE 69613591 D1	02-08-2001
		DE 69613591 T2	25-04-2002
		DK 876304 T3	15-10-2001
		EP 0876304 A1	11-11-1998
		GR 3036699 T3	31-12-2001
		JP 11512970 T	09-11-1999
		LT 98034 A ,B	27-07-1998
		PT 876304 T	30-11-2001
		WO 9708106 A1	06-03-1997
FR 2818265 A	21-06-2002	FR 2818265 A1	21-06-2002
		AU 1930702 A	24-06-2002
		WO 0248055 A1	20-06-2002
US 4895645 A	23-01-1990	NONE	